

N89-23009

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SODIUM SULFUR BATTERY FLIGHT EXPERIMENT DEFINITION STUDY

Rebecca R. Chang
Ford Aerospace Corporation
Palo Alto, California

and

Robert Minck
Ford Aerospace Corporation
Newport Beach, California

Sodium-sulfur batteries have been identified as the most likely successor to nickel-hydrogen batteries for space applications. One advantage of the Na/S battery system is that the usable specific energy is two to three times that of nickel-hydrogen batteries. This represents a significant launch cost savings or increased payload mass capabilities. Na/S batteries support NASA OAST's proposed Civil Space Technology Initiative goal of a factor of two improvement in spacecraft power system performance, as well as the proposed Spacecraft 2000 initiative.

The sodium-sulfur battery operates at between 300 and 400°C, using liquid sodium and sulfur/polysulfide electrodes and solid ceramic electrolyte. The transport of the electrode materials to the surface of the electrolyte is through wicking/capillary forces. These critical transport functions must be demonstrated under actual microgravity conditions before sodium-sulfur batteries can be confidently utilized in space.

Ford Aerospace Corporation, under contract to NASA Lewis Research Center, is currently working on the sodium-sulfur battery space flight experiment definition study. The objective is to design the experiment that will demonstrate operation of the sodium-sulfur battery/cell in the space environment with particular emphasis on evaluation of microgravity effects. Experimental payload definitions have been completed and preliminary designs of the experiment have been defined.